2.4 Natural Resource Studies

During Phase I of the Battleship TEXAS Permanent Dry Berth Project, the team conducted preliminary field surveys and literature reviews to develop a description of the existing environment surrounding the current mooring location of the Battleship TEXAS. The surveys were conducted to identify environmental constraints associated with three alternative sites identified at San Jacinto State Park (SJSP) for a permanent dry berth for the Battleship TEXAS. This information was used to assist the design team in evaluating potential dry berth options. Preliminary field surveys and literature reviews were conducted during the spring and summer of 2011. Maps depicting the locations of Alternatives B, C, and D are included in Attachment C, Appendix A.

Resources evaluated during this investigation included: waters of the United States (U.S.), including wetlands (herein referred to as waters and wetlands); threatened and endangered species; vegetation; soil; water resources; essential fish habitat (EFH); and coastal zone management constraints. Investigations related to air quality, noise, and environmental hazards (hazardous materials/waste) were not performed during the Phase I investigations, but would be performed early in Phase II as alternative sites are more fully defined and the National Environmental Policy Act compliance study is initiated.

2.4.1 Natural Resources

2.4.1.1 Assessment Methodology

During the preliminary environmental analysis, the existing environment was assessed using one of two levels of analysis at a scale appropriate for each resource described. A Level 1 Assessment included a holistic literature review in combination with an abbreviated site assessment for a particular resource in the general vicinity of SJSP. A Level 2 Assessment included a description of a particular resource based upon literature review as well as preliminary field surveys in the areas surrounding the current mooring location of the Battleship TEXAS. A Level 2 Assessment is intended to be more detailed than a Level 1 Assessment. Field data were collected and literature was reviewed for each environmental resource based upon the level of assessment described in Table 1. Results are reported for each alternative by resource type.

Table 1. Natural Resource Assessment Levels

Environmental Resource	Assessment Level		
	Level 1	Level 2	No Studies Performed
Waters and Wetlands		X	
Threatened and Endangered Species		X	
Vegetation		X	
Soils		X	
Water Resources	X		
Essential Fish Habitat		X	
Coastal Zone Management	X		
Air Quality			X
Noise			X
Environmental Hazards			X

2.4.1.2 Waters and Wetlands Assessment Methodology

A Level 2 Assessment was conducted in June and July 2011 for waters and wetlands at each alternative site. After reviewing available literature, such as maps and aerial photographs, biologists ground-truthed preliminary results by walking transects through each alternative site to determine the location and estimate the sizes of waters and wetlands.

The preliminary assessment of waters and wetlands was performed in accordance with methodologies described in the 1987 United States Army Corps of Engineers (USACE) Wetland Delineation Manual, the November 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region – Version 2.0, and industry standard guidelines for delineating the ordinary high water mark (OHWM), including the 2008 Harris County Flood Control District (HCFCD) OHWM Delineation Manual for Section 404 Waters.

2.4.1.3 Threatened and Endangered Species Assessment Methodology

A Level 2 Assessment was conducted for threatened and endangered species at each alternative site. The current lists of federal and state listed threatened and endangered species were consulted to determine the threatened and endangered species that are potentially located in Harris County, Texas. The federal list is maintained by the USFWS – Clear Lake Field Office and the state list is maintained by the TPWD. Biologists walked transects through each of the six alternative sites in June and July of 2011 and compared the habitat requirements of each of the listed species with habitats observed on the project site to determine the potential presence of listed species and their critical habitat.

The Texas Parks and Wildlife Natural Diversity Database (NDD) was not consulted during this preliminary evaluation for threatened and endangered species. The NDD provides a list of threatened and endangered species that have been observed and documented within a study area. It is recommended that the NDD be consulted at a later date when a more detailed analysis for threatened and endangered species is necessary.

2.4.1.4 Vegetation Assessment Methodology

A Level 2 Assessment was conducted to determine the vegetation types present at each alternative site. Biologists walked transects through each alternative site to delineate the vegetation types observed. Field notes were taken to describe the habitat type, including an inventory of the dominant species of vegetation observed.

2.4.1.5 Soils Assessment Methodology

A Level 2 Assessment was conducted to determine the soil types present at each alternative site, utilizing the United States Department of Agriculture's (USDA's) *Soil Survey of Harris County, Texas* – 1988 (Soil Survey) to determine the soil types present. Digital soil delineation files were overlaid onto aerial photographs to display the location of the soil types at each alternative site.

2.4.1.6 Water Resources Assessment Methodology

A Level 1 Assessment was conducted to determine the water resources present at each alternative site, including a review of available literature, maps, and aerial photographs. The 2008 Section 303(d) list, compiled by Texas Commission on Environmental Quality (TCEQ) was reviewed to identify water bodies at the alternative sites that exhibit water quality impairments.

2.4.1.7 Essential Fish Habitat Assessment Methodology

A Level 2 Assessment was conducted to determine if EFH is present at each alternative site. Prior to field surveys, biologists conducted literature reviews to determine if potential EFH might be located on the alternative sites. walked transects through each alternative site to determine the locations and size of potential EFH. The National Marine Fisheries Service (NMFS) online spatial database, "EFH Mapper v2.0", details species with EFH throughout the Gulf of Mexico and surrounding bays and estuaries. This tool was utilized to determine species with potential EFH located on each alternative site (http://www.habitat.noaa.gov/protection/efh/habitatmapper.html).

2.4.1.6 Coastal Zone Management Assessment Methodology

A Level 1 Assessment was conducted to describe the coastal zone management constraints located in the vicinity of the alternative sites, including a review of available literature, maps, and aerial photographs.

2.4.2 Environmental Results

2.4.2.1 Waters and Wetlands Results

Potentially jurisdictional waters and wetlands were identified on all alternative sites. Potentially non-jurisdictional upland cut drainage swales were observed within Alternative B and D. Figures depicting the approximate locations of all features identified on the alternative sites are included in Attachment C, Appendix B.

Table 2 lists the estimated size of potentially jurisdictional waters and wetlands that were observed at each of the alternative sites. The approximate acreage of potentially jurisdictional waters and wetlands as a percentage of the entire alternative site is also reported.

Table 2. Potential Waters of the U.S., including Wetlands, Preliminarily Assessed at Alternative Sites

Alternative	Size of Alternative (Acres)	Size of Potentially Jurisdictional Waters and Wetlands^ (Acres)	Potentially Jurisdictional Waters and Wetlands as a Percentage of Size of Each Alternative Site (%)
B	20	7.06	35
C	20	5.62	28
D	20	1.49	8

^Potentially Non-Jurisdictional upland cut drainage swales are not included in the total of potentially jurisdictional waters and wetlands.

2.4.2.2 Threatened and Endangered Species Results

Table 3 lists the federal and state listed species for Harris County, Texas, provides a description of their preferred habitat, and identifies potential habitat for each species within all alternative sites at SJSP.

Potential habitat for sixteen listed species was observed on the alternative sites, including habitat for black rail, brown pelican, Henslow's sparrow, snowy plover, southeastern snowy plover, white-faced ibis, American eel, smalltooth sawfish, plains spotted skunk, alligator snapping turtle, green sea turtle, gulf saltmarsh snake, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and smooth green snake. No listed species were observed during the field assessments. No critical habitat, as identified by the USFWS, is located on the alternative sites.

Intertidal saltmarsh was observed within Alternatives B and D and provides suitable foraging habitat for black rail, white-faced ibis, and gulf saltmarsh snake. The coastal location of SJSP with its surrounding estuarine waters provides habitat for brown pelican on all alternative sites.

Open water estuarine areas in Buffalo Bayou were observed in Alternatives B and C and provide suitable habitat for brown pelican, American eel, smalltooth sawfish, alligator snapping turtle, gulf saltmarsh snake, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle.

Intertidal sand flats were observed within Alternative C and provide suitable habitat for snowy plover and southeastern snowy plover.

Scrub/shrub upland and/or open grassy fields were observed within Alternatives B, C, and D and provide suitable habitat for plains spotted skunk.

Herbaceous uplands with coastal prairie bunch grasses were observed within Alternatives C and D providing habitat for Henslow's sparrow and the smooth green snake.

Several listed bird species may visit all alternative sites as transitory migrants, including American and Arctic peregrine falcon, white-tailed hawk, and whooping crane. Habitat types are described below in the results section for vegetation. Maps depicting the locations of the habitat types observed within each alternative site are located in Attachment C, Appendix C.

Table 3: Federal and State Listed Threatened and Endangered Species In Harris County, Texas

Common Name	Scientific Name	State Status	Federal Status	Habitat Description	Habitat Present		
					Alternative		
					B	C	D
AMPHIBIANS							
Houston Toad	*Anaxyrus houstonensis*	E	E†	Sandy soil, breeds in ephemeral pools	No	No	No
BIRDS							
American Peregrine Falcon	*Falco peregrinus anatum*	T	DL†	Potential migrant, nest in west Texas	TM	TM	TM
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	-	DL†	Potential migrant	TM	TM	TM
Bald Eagle	*Haliaeetus leucocephalus*	T	T†	Near waterbodies, in tall trees	No	No	No
Black Rail	*Laterallus jamaicensis*	SOC	SOC†	Brackish and freshwater marshes, nest at base of *Salicornia*	Yes	No	Yes
Brown Pelican	*Pelecanus occidentalis*	E	DL†	Near coastal areas	Yes	Yes	Yes
Henslow's Sparrow	*Ammodramus henslowii*	SOC	-	Weedy fields with bunch grasses	No	Yes	Yes
Mountain Plover	*Charadrius montanus*	SOC	-	Shortgrass plains; plowed, bare fields	No	No	No
Red-cockaded Woodpecker	*Picoides borealis*	E	E†	Nests in older pines, forages in younger pine, prefers longleaf, shortleaf, and loblolly	No	No	No
Snowy Plover	*Charadrius alexandrinus*	SOC	SOC†	Beach and bayside mud or salt flats	No	Yes	No
Southeastern Snowy Plover	*Charadrius alexandrinus tenuirostris*	SOC	UR†	Beach and bayside mud or salt flats	No	Yes	No
Sprague's Pipit	*Anthus spragueii*	SOC	C†	Native upland prairies; only in Texas during migration and winter	No	No	No
White-faced Ibis	*Plegadis chihi*	T	-	Freshwater marshes, but some brackish or salt marshes	Yes	No	Yes
White-tailed Hawk	*Buteo albicaudatus*	T	-	Coastal Prairies	TM	TM	TM
Whooping Crane	*Grus americana*	E	E†	Winters in Aransas NWR	TM	TM	TM
Wood Stork	*Mycteria americana*	T	E†	Prairie ponds and flooded pastures	No	No	No
FISH							
American Eel	*Anguilla rostrata*	SOC	UR†	Muddy bottoms, still waters, large streams, lakes, brackish estuaries with access to ocean	Yes	Yes	No
Creek Chubsucker	*Erimyzon oblongus*	T	-	Variety of small rivers and creeks, prefers headwaters	No	No	No

Table 3: Federal and State Listed Threatened and Endangered Species In Harris County, Texas

Common Name	Scientific Name	State Status	Federal Status	Habitat Description	Habitat Present		
					Alternative		
					B	C	D
Smalltooth Sawfish	*Pristis pectinata*	E	E†	Adults in variety of habitats; young found near shore in muddy and sandy bottoms of bays, shallow banks, estuaries, river mouths	Yes	Yes	No
MAMMALS							
Louisiana Black Bear	*Ursus americanus luteolus*	T	T†	Bottomland hardwoods; large, undisturbed forested areas	No	No	No
Plains Spotted Skunk	*Spilogale putorius interrupta*	SOC	-	General; woods, fields, prairies, shrub	Yes	Yes	Yes
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	T	-	Cavity trees in hardwood forest, concrete culverts, abandoned buildings	No	No	No
Red Wolf	*Canis rufus*	E	E†	Extirpated, formerly known in brushy and forested areas, and coastal prairies	No	No	No
Southeastern Myotis Bat	*Myotis austroriparius*	SOC	-	Cavity trees in hardwood forest, concrete culverts, abandon buildings	No	No	No
MOLLUSKS							
Little Spectaclecase	*Villosa lienosa*	SOC	-	Creeks, rivers, and reservoirs, sandy substrates in slight to moderate current, usually along the banks	No	No	No
Louisiana Pigtoe	*Pleurobema riddellii*	T	-	Streams and moderate-size rivers; usually flowing water on substrates of mud, sand, and gravel	No	No	No
Sandbank Pocketbook	*Lampsilis satura*	T	-	Small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms	No	No	No
Texas Pigtoe	*Fusconaia askewi*	T	-	Rivers with mixed mud, sand, and fine gravel in protected areas	No	No	No
Wabash Pigtoe	*Fusconaia flava*	SOC	-	Creeks to large rivers; mud, sand and gravel; not in deep shifting sands.	No	No	No
REPTILES							
Alligator Snapping Turtle	*Macroclemys temmincki*	T	UR†	Deep water of rivers and canals	Yes	Yes	No
Green Sea Turtle	*Chelonia mydas*	T	T†	Gulf and bay system	Yes	Yes	No
Gulf Saltmarsh Snake	*Nerodia clarkii*	SOC	-	Saline flats, coastal bays, brackish river mouth	Yes	Yes	Yes
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	E†	Gulf and bay system	Yes	Yes	No

Table 3: Federal and State Listed Threatened and Endangered Species In Harris County, Texas

Common Name	Scientific Name	State Status	Federal Status	Habitat Description	Habitat Present		
					Alternative		
					B	C	D
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E†	Gulf and bay system	Yes	Yes	No
Loggerhead Sea Turtle	*Caretta caretta*	T	T†	Gulf and bay system	Yes	Yes	No
Smooth Green Snake	*Liochlorophis vernalis*	T	-	Gulf coastal prairies, prefers dense vegetation	No	Yes	Yes
Texas Horned Lizard	*Phrynosoma cornutum*	T	-	Open, semi-arid regions, with bunch grass	No	No	No
Timber/Canebrake Rattlesnake	*Crotalus horridus*	T	-	Swamps/floodplains of hardwood/upland pine	No	No	No
VASCULAR PLANTS							
Coastal Gay-feather	*Liatris bracteata*	SOC	-	Black clay soil of coastal prairie remnants	No	No	No
Giant Sharpstem Umbrella-Sedge	*Cyperus cephalanthus*	SOC	-	Wet blackland prairie soils	No	No	No
Houston Daisy	*Rayjacksonia* (*Machaeranthera*) *aurea*	SOC	-	Seasonally wet, saline barren areas	No	No	No
Texas Meadow-rue	*Thalictrum texanum*	SOC	-	Mesic woodlands, partially shaded ditches	No	No	No
Texas Prairie Dawn	*Hymenoxys texana*	E	E	Poorly drained areas in open grasslands; pimple mounds	No	No	No
Texas Windmill-grass	*Chloris texensis*	SOC	-	Sand/sandy loam in open/barren grasslands	No	No	No
Threeflower Broomweed	*Thurovia triflora*	SOC	-	Black clay soils of remnant grasslands, also tidal flats	No	No	No

NOTES:

- These species occur on the State listing of threatened or endangered species for Harris County; however, they are not federally listed at this time by the U.S. Fish and Wildlife Service - "Texas Parks and Wildlife Department. Annotated County Lists of Rare Species. Harris County. Last Revision 5/25/2011" http://gis2.tpwd.state.tx.us/ReportServer$GIS_EPASDE_SQL/Pages/ReportViewer.aspx?%2fReport+Project2%2fReport5&rs:Command=Render&county=Harris (Accessed August 26, 2011)

† These species are listed statewide by USFWS but are not listed by the USFWS Region 2 – Clear Lake office as occurring in Harris County, Texas. http://www.fws.gov/southwest/es/EndangeredSpecies/lists/ListSpecies.cfm (Accessed August 26, 2011)

E = Endangered
T = Threatened
SOC = Species of Concern (TPWD or USFWS)
PDL = Proposed for Delisting
DL = Delisted Taxon, recovered, being monitored first five years
TM = Transitory Migrant
UR = Under Review/Species of Concern
C = Federal Candidate for Listing

2.4.2.3 Vegetation Results

Vegetation types observed within the alternative sites include maintained parkland, scrub/shrub uplands, herbaceous uplands, palustrine scrub/shrub wetlands, intertidal saltmarsh, intertidal sand flats (special aquatic site), and open water. Table 4 displays the vegetation types that are located within each of the alternative sites. Maps depicting the locations of the vegetation types are located in Attachment C, Appendix C.

Table 4. Vegetation Types at Alternative Sites

Alternative	Maintained Parkland	Scrub/Shrub Uplands	Herbaceous Uplands	Palustrine Scrub/Shrub Wetlands	Intertidal Saltmarsh	Intertidal Sand Flats (Special Aquatic Site)	Open Water
B	X				X		X
C	X	X	X	X		X	X
D	X	X	X	X	X		

2.4.2.3.1 *Maintained Parkland*

Regularly maintained parklands were observed in Alternatives B, C, and D. The majority of this community type was located in close proximity to the existing Battleship TEXAS visitor facilities. This vegetative community was dominated by herbaceous vegetation, including perennial ryegrass (*Lolium perenne*), Bermudagrass (*Cynodon dactylon*), common carpetgrass (*Axonopus fissifolius*), bahiagrass (*Paspalum notatum*), Indian woodoats (*Chasmanthium latifolium*), Cuman ragweed (*Ambrosia psilostachya*), pinkladies (*Oenothera speciosa*), powderpuff (*Mimosa strigilloa*), curly dock (*Rumex crispus*), southern crabgrass (*Digitaria ciliaris*), and plains bristlegrass (*Setaria vulpiseta*). Various landscaped tree species were interspersed throughout this habitat type, including live oak (*Quercus virginiana*), southern magnolia (*Magnolia grandiflora*), and bald cypress (*Taxodium distichum*).

2.4.2.3.2 *Scrub/shrub Uplands*

A scrub/shrub upland community was observed in Alternatives C and D. This vegetative community was dominated by saplings and shrubs, including sugarberry (*Celtis laevigata*), salt cedar (*Tamarix ramosissima*), Chinese tallow (*Triadica sebifera*), Chinaberry (*Melia azedarach*), wax myrtle (*Morella cerifera*), green ash (*Fraxinus pennsylvanica*), yaupon (*Ilex vomitoria*), Chinese privet (*Ligustrum sinense*), and eastern baccharis (*Baccharis halimifolia*). This community also exhibited herbaceous and vine strata dominated by great ragweed (*Ambrosia trifida*), giant reed (*Arundo donax*), Cuman ragweed, Johnsongrass (*Sorghum halepense*), sugarcane plumegrass (*Saccharum giganteum*), Macartney rose (*Rosa bracteata*), muscadine (*Vitis rotundifolia*), roundleaf greenbrier (*Smilax rotundifolia*), peppervine (*Ampelopsis arborea*), field blackberry (*Rubus arvensis*), poison ivy (*Toxicodendron radicans*), and Japanese honeysuckle (*Lonicera japonica*).

2.4.2.3.3 *Herbaceous Uplands*

An unmaintained herbaceous upland community was observed in Alternatives C and D. This vegetative community was dominated by herbaceous vegetation consisting primarily of saltgrass (*Distichlis spicata*). A shrub stratum was also observed in this community type, including eastern baccharis, salt cedar, and poisonbean (*Sesbania drummondii*).

2.4.2.3.4 Palustrine Scrub/Shrub Wetlands

A palustrine scrub/shrub wetland community was observed in Alternatives C and D. This vegetative community was dominated by saplings and shrubs, including Chinese tallow and eastern baccharis. This community also exhibited herbaceous and vine strata dominated by sugarcane plumegrass, giant reed, swamp smartweed (*Polygonum hydropiperoides*), common rush (*Juncus effusus*), curly dock, great ragweed, Maccartney rose, and roundleaf greenbrier.

2.4.2.3.5 *Intertidal Saltmarsh*

An intertidal saltmarsh community was observed in Alternatives B and D. This vegetative community received regular tidal inundation from surrounding estuarine waters and was dominated by herbaceous vegetation, including smooth cordgrass (*Spartina alterniflora*), gulf cordgrass (*Spartina spartinae*), saltmeadow cordgrass (*Spartina patens*), bushy seaside tansy (*Borrichia frutescens*), saltgrass, and eastern baccharis.

2.4.2.3.6 *Intertidal Sand Flats (Special Aquatic Site)*

Intertidal sand flats (special aquatic site) were observed along portions of the shorelines along the Houston Ship Channel. The sand flats observed were predominantly un-vegetated, although sparse vegetated was observed in some areas and was comprised of saltgrass and smooth cordgrass. This community type was observed in Alternative Site C. No other special aquatic sites were observed.

2.4.2.3.7 *Open Water*

Open water habitat was observed within the areas inundated by the Houston Ship Channel in Alternatives B and C. No vegetation was observed in open water areas.

2.4.2.4 Soil Results

Three soil types are mapped by the NRCS within the limits of the alternative sites: Ijam Soils (Is), Lake Charles clay, 1 to 3 percent slopes (LcB), and Lake Charles clay, 0 to 1 percent slopes (LcA). Only Ijam Soils is listed as a hydric soil in Harris County, Texas, according to the *National Hydric Soils List* updated February 2011 by the National Technical Committee for Hydric Soils (NTCHS). Descriptions for each of these soils are below and were taken from the USDA's Soil Survey.

Table 5 displays the soil types that are located within each of the alternative sites investigated. Areas classified as Water (W) are submerged by water features and were found on all alternative sites. A 2008 Aerial Photograph with NRCS Soil Survey Data Overlay is included in Attachment C, Appendix D for each alternative site.

Table 5. Soil Types at Alternative Sites

Alternative	Ijam Soils (Is)	Lake Charles Clay, 0 to 1 percent slopes (LcA)	Lake Charles Clay, 1 to 3 percent slopes (LcB)	Water (W)
B	X	X	X	X
C	X		X	X
D	X		X	X

2.4.2.4.1 *Ijam Soils (Is)*

Ijam soils are found in Alternatives B, C, and D. This soil series is nearly level and found on coastal flats. Typical soil boundaries generally coincide with earthen dikes constructed to impound the clayey sediment dredged or pumped from the floor of adjacent waterways. This soil series is very poorly drained. The water table fluctuates from the surface in wet periods to a depth of about 30 inches in dry periods. Surface runoff is very slow to ponded. The available water capacity is medium. The surface layer is very firm, moderately alkaline, dark gray clay about 8 inches thick. The layer below that, to a depth of 60 inches, is very firm, moderately alkaline, gray clay that has mottles of yellowish brown and a few shell fragments.

2.4.2.4.2 *Lake Charles clay, 0 to 1 percent slope (LcA)*

This soil series is found in Alternative B. These soils are nearly level, somewhat poorly drained clay soils within undisturbed areas characterized by gilgai microrelief consisting of microdepressions and hummocks. Surface runoff is very slow. Permeability and drainage are very slow. The available water capacity is high. When this soil is dry, deep, wide cracks form on the surface. Water enters rapidly through the cracks, but it enters very slowly when the soil is wet and the cracks are sealed. The surface layer is approximately 36 inches thick. In the upper 22 inches it is a very firm, neutral, black clay. The layer below consists of mildly alkaline, very dark gray clay approximately 14 inches thick. The next layer is about 16 inches thick and consists of very firm, mildly alkaline, dark gray clay. The next layer to a depth of 74 inches, is a very firm, mildly alkaline, gray clay that is mottled olive-brown ad yellowish-brown.

2.4.2.4.3 *Lake Charles Clay, 1 to 3 percent slopes (LcB)*

This soil series is found in Alternative B, C, and D. The soil series includes gently sloping soils along ridges and natural drainage ways. This soil series is somewhat poorly drained. Surface runoff is very slow. Permeability and drainage are very slow. The available water capacity is high. When this soil is dry, deep, wide cracks form on the surface. Water enters rapidly through the cracks, but it enters very slowly when the soil is wet and the cracks are sealed. The surface layer is approximately 30 inches thick. In the upper 18 inches it is a very firm, neutral, black clay. The next layer consists of very firm, mildly alkaline, very dark gray clay approximately 12 inches thick. The layer below that is about 18 inches thick and consists of very firm, mildly alkaline, dark gray clay. The lower layer, to a depth of 60 inches, is a very firm, mildly alkaline, gray clay that is mottled olive-brown ad yellowish-brown.

2.4.2.5 Water Resources Results

Water resources recorded in the area surrounding the SJSP include the tidal waters associated with the Houston Ship Channel, also known as Buffalo Bayou.

TCEQ Segment 1006_02 includes the portion of Buffalo Bayou from its confluence with the San Jacinto River to Patrick Bayou. Segment 1006_02 is located adjacent to the north and west of SJSP and was observed within or adjacent to Alternatives B, C, and D.

Segment 1006_02 is listed by the State of Texas 303(d) list as impaired for both dioxins and polychlorinated biphenyls (PCBs) in edible tissues of aquatic organisms. The Texas Department of State Health Services (DSHS) has maintained seafood consumption advisories for the waters of Buffalo Bayou around SJSP since 1990. The advisories were issued due to studies that indicated high levels of

dioxins in catfish and blue crabs (Advisory 3, issued by DSHS September 19, 1990) and the unsafe levels of organochlorine, pesticides, and PCBs in all fish species (Advisory 20, issued by DSHS October 9, 2001) within upper Galveston Bay and the Houston Ship channel.

2.4.2.6 Essential Fish Habitat Results

EFH was observed within Alternatives B, C, and D, including estuarine tidal waters, intertidal flats, and saltmarsh associated with the tidal waters of the Houston Ship Channel, also known as Buffalo Bayou. These types of habitats are considered to be EFH and provide nursery, foraging, and refuge opportunities for a variety of recreational and commercially important marine fisheries species, including Atlantic croaker (*Micropogonias undulates*), blue crab (*Callinectes sapidus*), black drum (*Pogonias cromis*), brown shrimp (*Farfantepenaeus aztecus*), Gulf menhaden (*Brevoortia patronus*), oyster (Crassostrea virginica), spotted sea trout (*Cynoscion neulosus*), stripped mullet (*Mugil cephalus*), red drum (*Sciaenops ocellatus*), sheepshead (*Archosargus probatocephalus*), southern flounder (*Paralichthys lethostigma*), and white shrimp (*Litaepenaeus setiferus*).

Table 6 details the approximate acreage of EFH including estuarine tidal waters, intertidal flats, and saltmarsh within each of the alternative sites investigated.

Table 6: Essential Fish Habitat within the Six Alternative Sites

Alternative	Size of Alternative (Acres)	Size of EFH (Acres)	EFH Size as a Percentage of Size of Each Alternative Site (%)
B	20	7.06	35
C	20	4.45	22
D	20	0.21	1

Species and species assemblages that NMFS identifies as having EFH within the waters surrounding SJSP are listed in Table 7.

Table 7. Species or Species Assemblages Identified as having EFH within the waters surrounding SJSP

Species or Species Assemblages	EFH Present (Life Stage)	
	Juvenile	Adult
Coastal Migratory Pelagics	X	X
Red Drum	X	X
Reef Fish	X	X
Shrimp	X	X
Stone Crab	X	X

2.4.2.7 Coastal Zone Management Results

The National Coastal Zone Management (CZM) Program is a voluntary partnership between the federal government and U.S. coastal and Great Lake states and territories (states) authorized by the Coastal Zone Management Act (CZMA) of 1972 to address national coastal issues. The CZMA provides the basis for protecting, restoring, and responsibly developing diverse coastal communities and resources throughout the nation. To meet the goals of the CZMA, the National CZM Program takes a comprehensive approach to coastal resource management, balancing the often competing and potentially conflicting demands of coastal resource use, economic development, and conservation.

The federal consistency provision, Section 307 of the CZMA (16 USC § 1456), is an incentive for states to join the CZM Program and is a tool that states use to manage coastal uses and resources and to facilitate cooperation and coordination with federal agencies. Federal consistency is the CZMA requirement that federal activities having reasonably foreseeable effects on any land or water use or natural resource of the coastal zone, also referred to as coastal uses or resources and coastal effects, must be consistent with the enforceable policies of a coastal state's federally approved coastal management program to the maximum extent practicable. The lead state agency for federal consistency reviews in the state of Texas is the Texas General Land Office (GLO).

The SJSP is located within the boundary that the GLO has demarcated as the Coastal Zone Boundary within the State of Texas. Permanent dry berthing of the Battleship TEXAS on Alternative B, C, or D would require coordination with the GLO and consistency with the goals and policies of the CZM Program as identified within the Texas Administrative Code, Title 31, Part 16, Chapter 501.

APPENDIX A

Permanent Dry Berth Alternatives at San Jacinto State Park

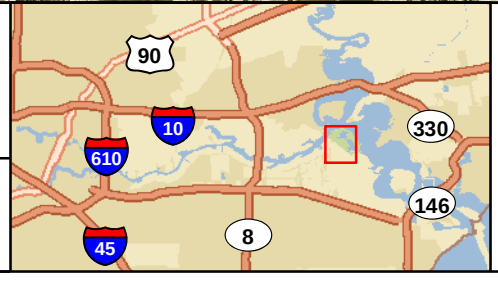
N

0 450 900

Feet

2008 Aerial Photograph - Houston-Galveston Area Council

CROUCH ENVIRONMENTAL SERVICES, INC.



AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

ALTERNATIVE B

Harris County, Texas

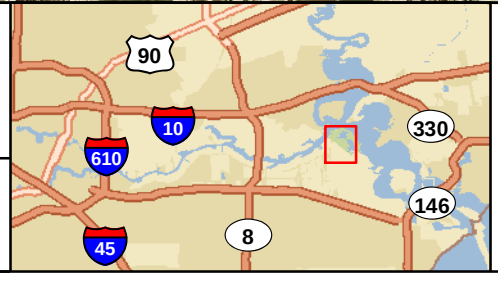
N

0 450 900

Feet

2008 Aerial Photograph - Houston-Galveston Area Council

CROUCH ENVIRONMENTAL SERVICES, INC.



AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

ALTERNATIVE C

Harris County, Texas

N

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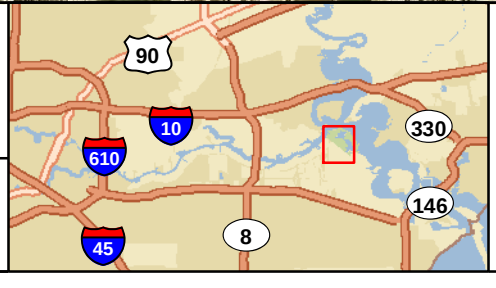
Feet

2008 Aerial Photograph - Houston-Galveston Area Council

CROUCH ENVIRONMENTAL SERVICES, INC.



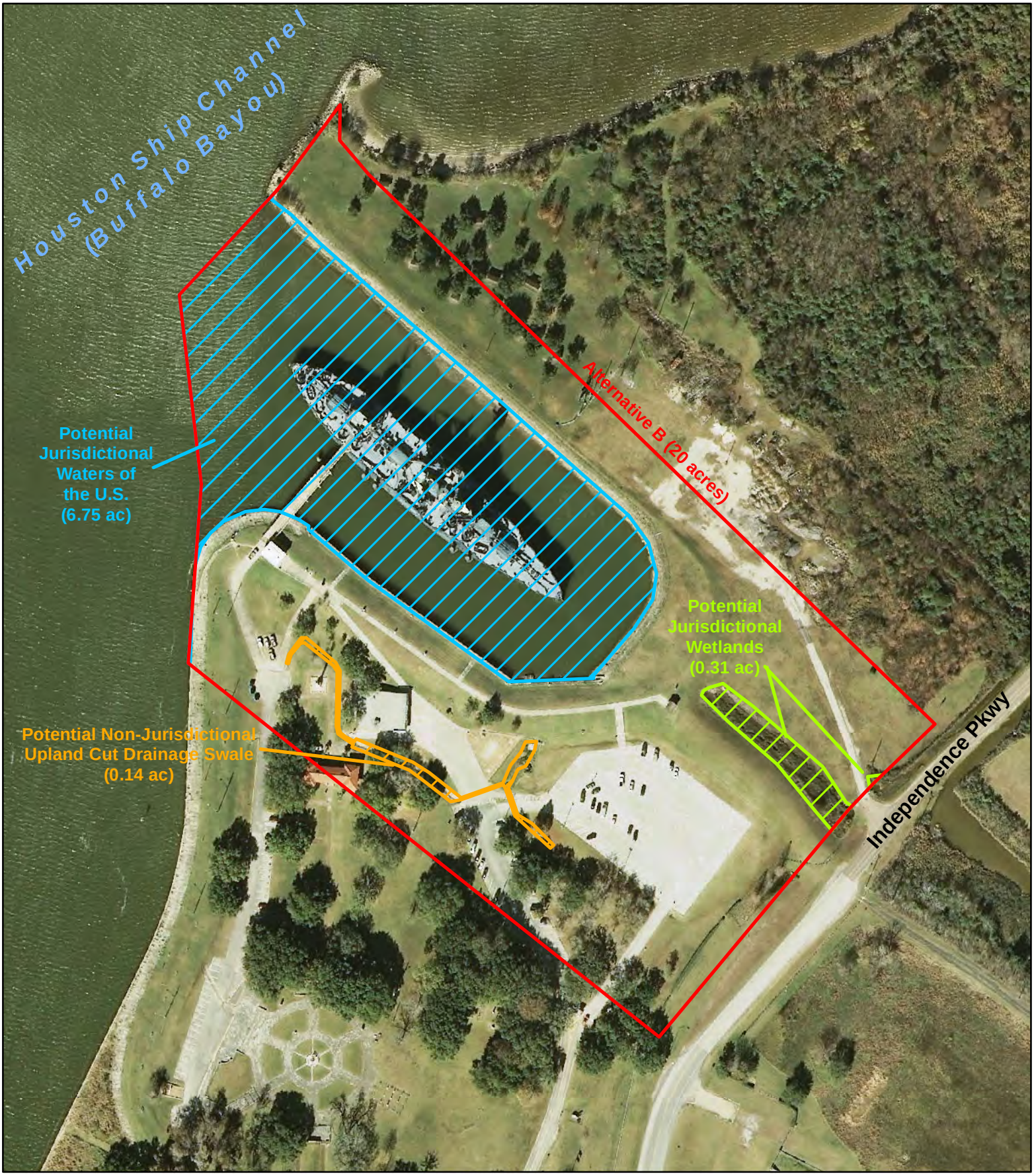
AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

ALTERNATIVE D

Harris County, Texas

APPENDIX B

Preliminary Wetland Assessment of Alternative Sites



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2008 Aerial Photograph - Houston-Galveston Area Council

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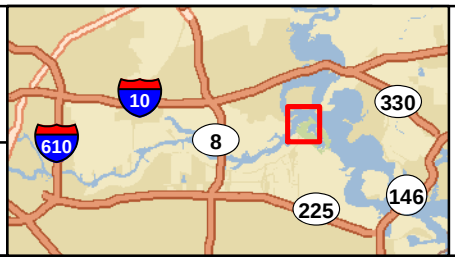
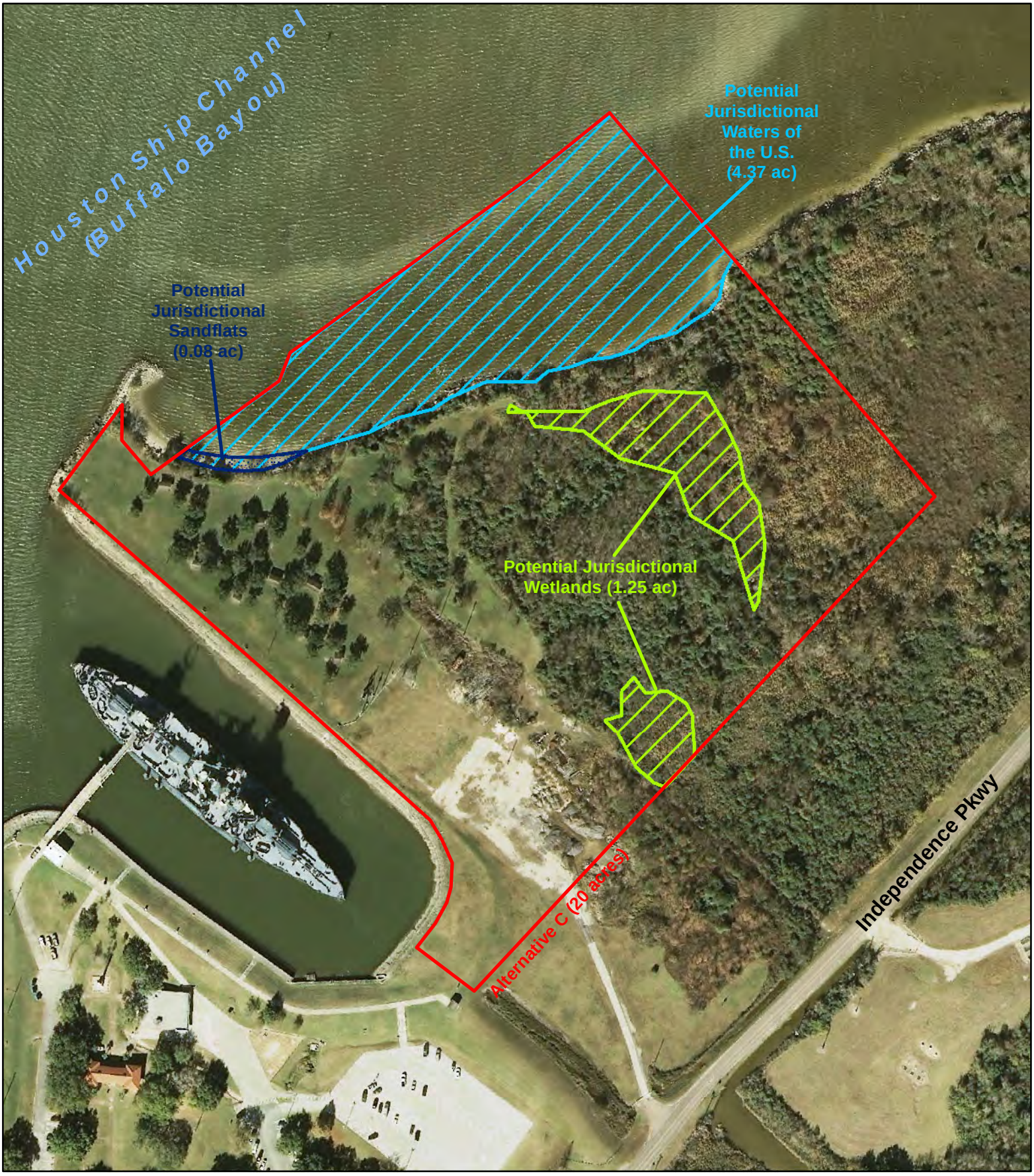


AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

POTENTIALLY JURISDICTIONAL WATERS OF THE U.S., INCLUDING WETLANDS WITHIN ALTERNATIVE B

Harris County, Texas



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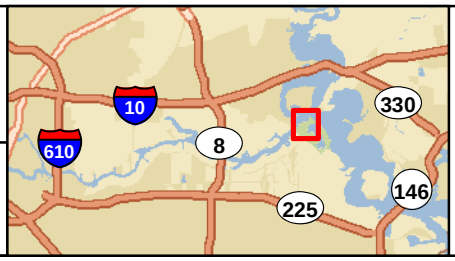
2008 Aerial Photograph - Houston-Galveston Area Council

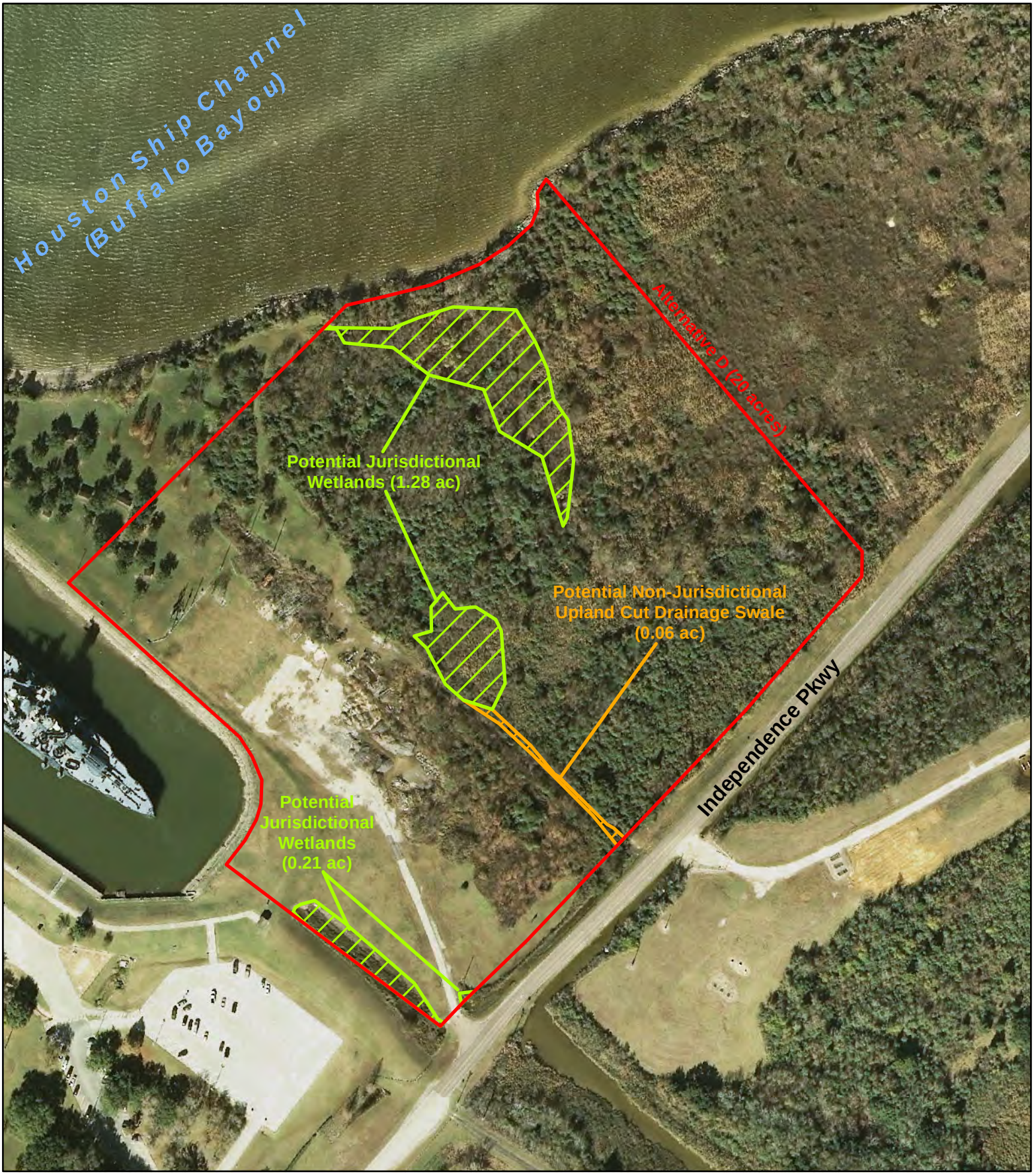
CROUCH ENVIRONMENTAL SERVICES, INC.



AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

POTENTIALLY JURISDICTIONAL WATERS OF THE U.S., INCLUDING WETLANDS WITHIN ALTERNATIVE C

Harris County, Texas



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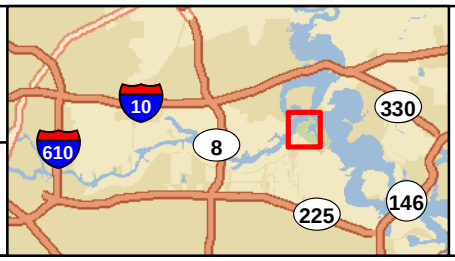
Feet

2008 Aerial Photograph - Houston-Galveston Area Council

CROUCH ENVIRONMENTAL SERVICES, INC.



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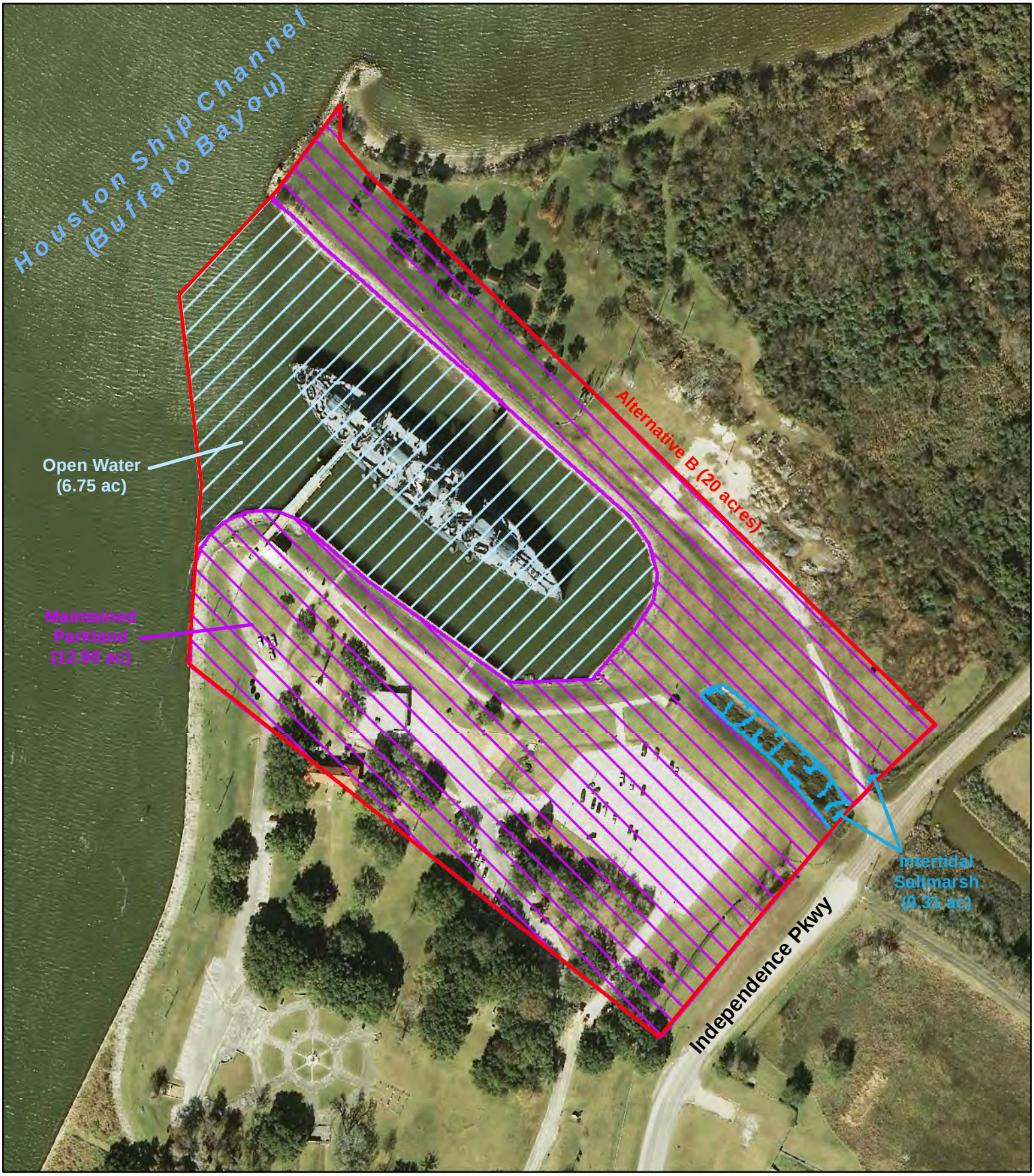
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

POTENTIALLY JURISDICTIONAL
WATERS OF THE U.S., INCLUDING
WETLANDS WITHIN ALTERNATIVE D

Harris County, Texas

APPENDIX C

Habitat/Vegetation Maps of Alternative Sites



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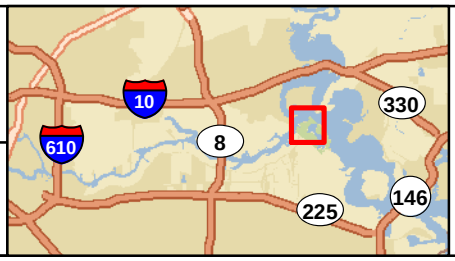
2008 Aerial Photograph - Houston-Galveston Area Council

CROUCH ENVIRONMENTAL SERVICES, INC.



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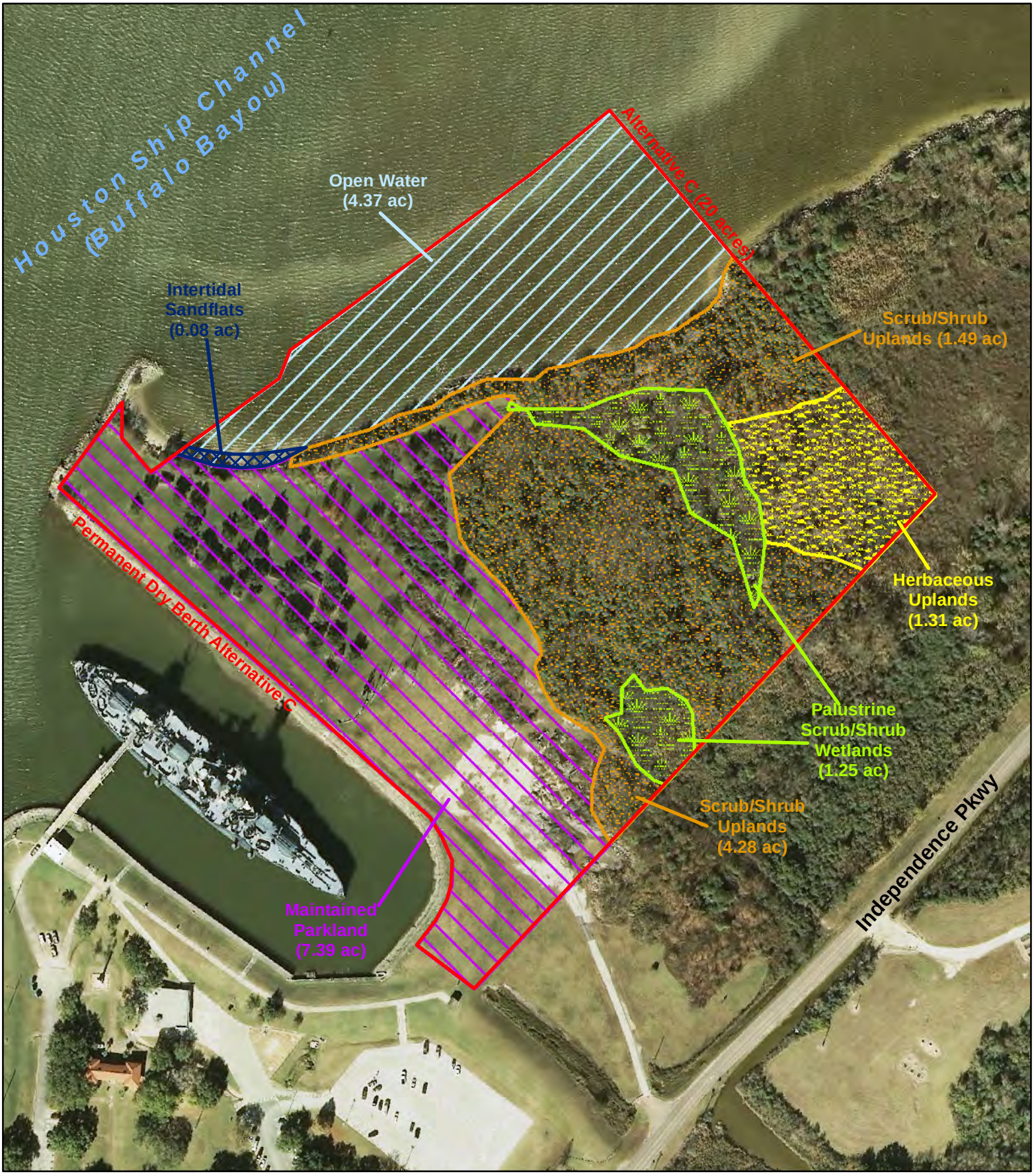
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

VEGETATIVE COMMUNITIES WITHIN ALTERNATIVE B

Harris County, Texas



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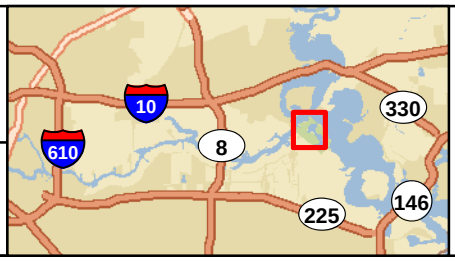
Feet

2008 Aerial Photograph - Houston-Galveston Area Council

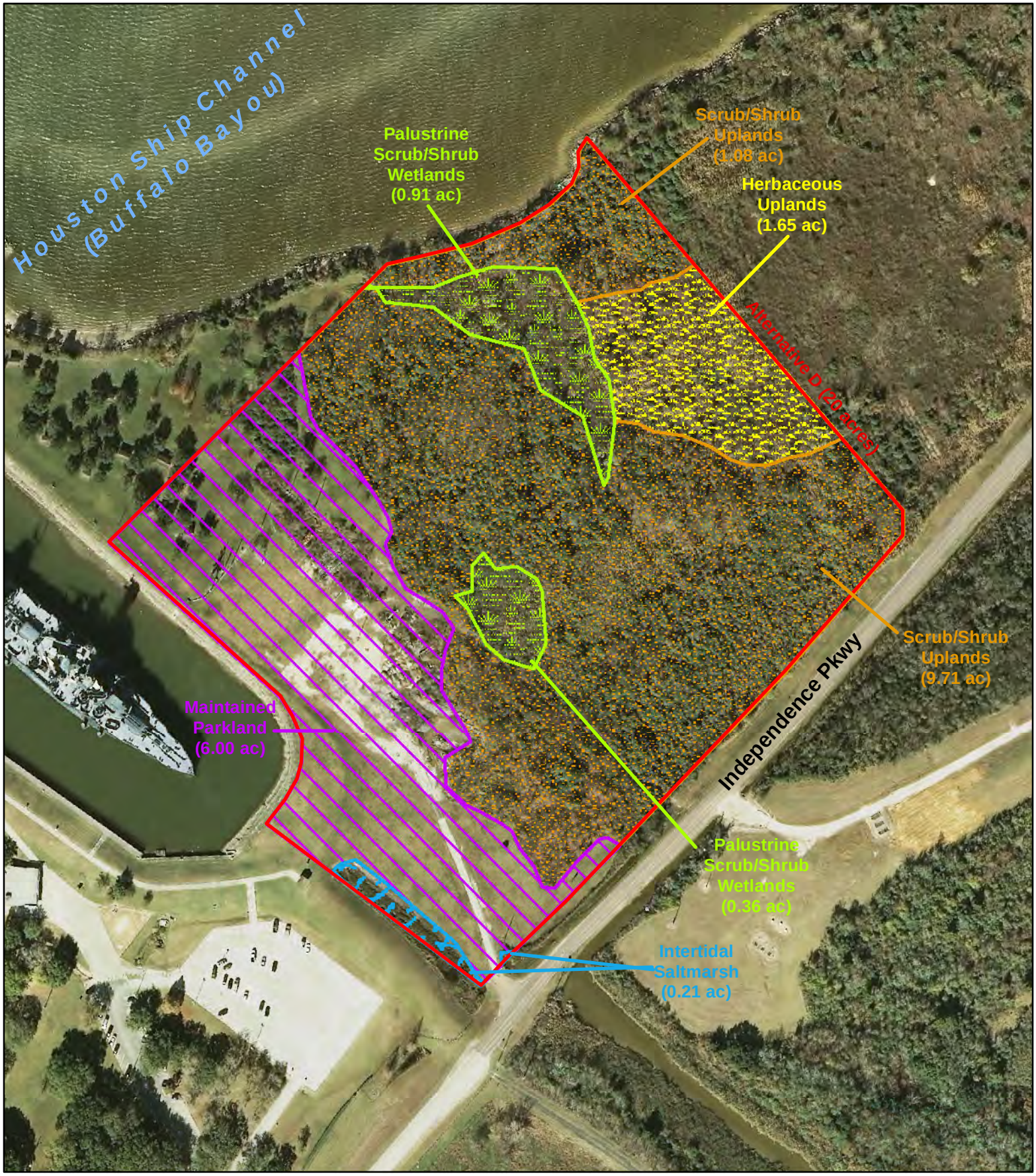
CROUCH ENVIRONMENTAL SERVICES, INC.



AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

VEGETATIVE COMMUNITIES WITHIN ALTERNATIVE C

Harris County, Texas



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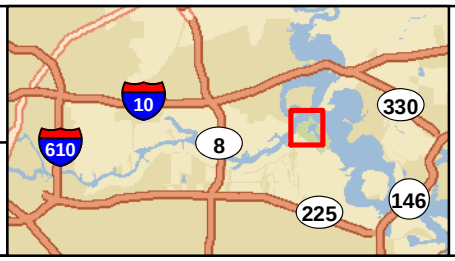
Feet

2008 Aerial Photograph - Houston-Galveston Area Council

CROUCH ENVIRONMENTAL SERVICES, INC.



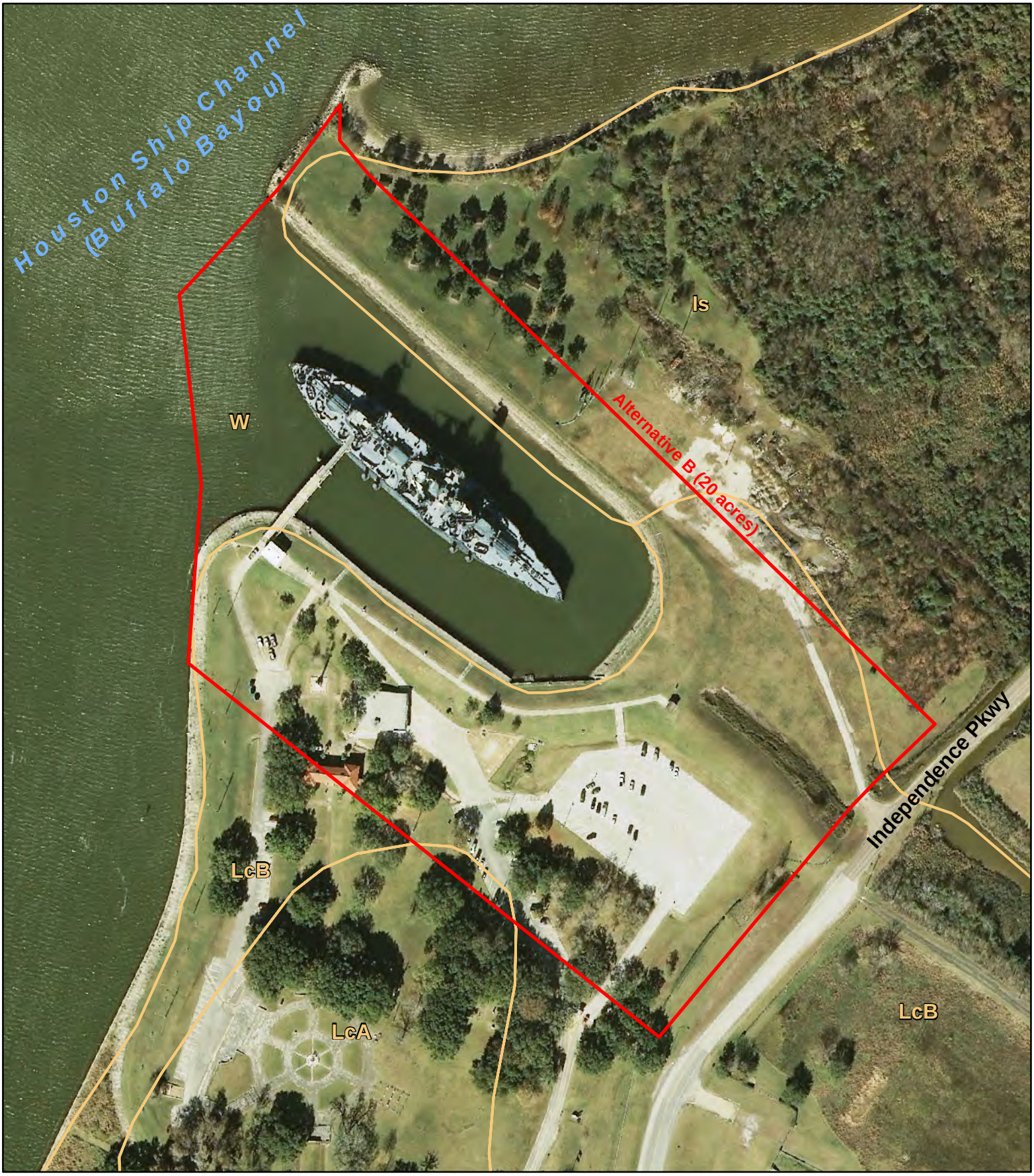
AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

VEGETATIVE COMMUNITIES WITHIN ALTERNATIVE D

Harris County, Texas

APPENDIX D

NRCS Soils Maps of Alternative Sites



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2008 Aerial Photograph - Houston-Galveston Area Council

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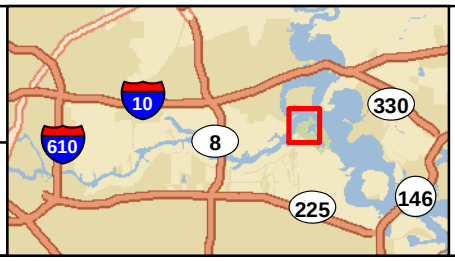


AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

NRCS SOIL SERIES WITHIN ALTERNATIVE B

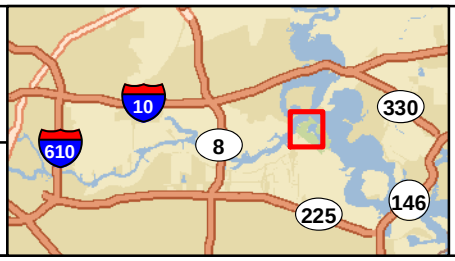
Harris County, Texas

N

0 100 200 Feet

2008 Aerial Photograph - Houston-Galveston Area Council

CROUCH ENVIRONMENTAL SERVICES, INC.



AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

NRCS SOIL SERIES WITHIN ALTERNATIVE C

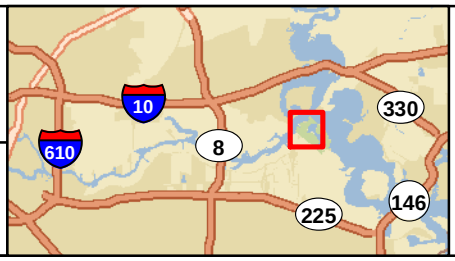
Harris County, Texas

N

0 100 200 Feet

2008 Aerial Photograph - Houston-Galveston Area Council

CROUCH ENVIRONMENTAL SERVICES, INC.



AECOM
TPWD Battleship Texas Dry Berth Project
TPWD Project No. 101887

NRCS SOIL SERIES WITHIN ALTERNATIVE D

Harris County, Texas